NPN Silicon Epitaxial Planar Transistor

TMMST3904

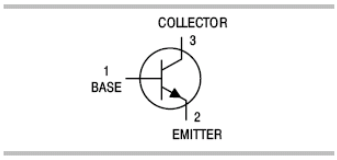
Features

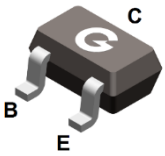
HF

- Epitaxial planar die construction
- Complimentary to TMMST3906
- Ultra-small surface mount package
- Halogen free
- Qualified to AEC-Q101 standards for high reliability

Mechanical Data

- Case: SOT-323
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Tin-plated; solderability per MIL-STD-202, Method 208





SOT-323

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TMMST3904	SOT-323	3000 pcs / Tape & Reel	K2N

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Collector-Base Breakdown Voltage	V_{CBO}	60	V
Collector-Emitter Breakdown Voltage	V_{CEO}	40	V
Emitter-Base Breakdown Voltage	V_{EBO}	5	V
Continuous Collector Current	I_C	0.2	A
Peak Collector Current	I_{CM}	0.2	A
Peak Base Current	I_{BM}	0.1	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Power Dissipation	P_D	200	mW
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	500	°C/W
Thermal Resistance Junction-to-Case *1	$R_{\theta JC}$	270	°C/W
Thermal Resistance Junction-to-Lead 1	$R_{\theta JL}$	300	°C/W
Operating junction Temperature	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Note 1: The data tested by surface mounted on a minimum recommended FR-4 board

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0	60	-	-	V
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 1mA, I_B = 0	40	-	-	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E = 10μA, I_C = 0	5	-	-	V
Collector Cut-off Current	I_{CBO}	V_{CB} = 40V, I_E = 0	-	-	50	nA
Collector Cut-off Current	I_{CES}	V_{CE} = 30V, I_B = 0	-	-	50	nA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 3V, I_C = 0	-	-	50	nA
DC Current Gain	h_{FE}	V_{CE} = 1V, I_C = 0.1mA	40	-	-	-
		V_{CE} = 1V, I_C = 1mA	70	-	-	-
		V_{CE} = 1V, I_C = 10mA	100	-	300	-
		V_{CE} = 1V, I_C = 50mA	60	-	-	-
		V_{CE} = 1V, I_C = 100mA	30	-	-	-
Collector-emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 10mA, I_B = 1mA	-	-	0.2	V
		I_C = 50mA, I_B = 5mA	-	-	0.3	V
Base-emitter Saturation Voltage	$V_{BE(sat)}$	I_C = 10mA, I_B = 1mA	0.65	-	0.85	V
		I_C = 50mA, I_B = 5mA	-	-	0.95	V
Transition Frequency	f_T	I_C = -10mA, V_{CE} = 20V	300	-	-	MHz
Collector Output Capacitance	C_{OBO}	V_{CB} = 5V, I_E = 0, f = 1MHZ	-	-	4	pF
Input Capacitance	C_{IBO}	V_{EB} = 0.5V, I_C = 0, f = 1MHz	-	-	8	pF
Noise Figure	N_F	V_{CE} = 5V, I_C = 100μA, R_S = 1kΩ f = 10Hz to15.7kHz	-	-	5	dB
Delay Time	t_d	V_{CC} = 3V, I_C = 10mA $V_{BE(OFF)}$ = -0.5V, I_{B1} = 1mA	-	-	35	ns
Rise Time	t_r		-	-	35	ns
Storang Time	t_s	V_{CC} = 3V, I_C = 10mA I_{B1} = I_{B2} = 1mA	-	-	200	ns
Fall Time	t_f		-	-	50	ns

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

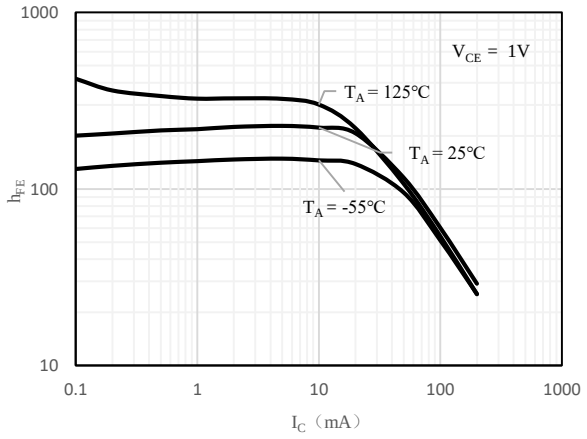


Fig 1 h_{FE} vs. I_C

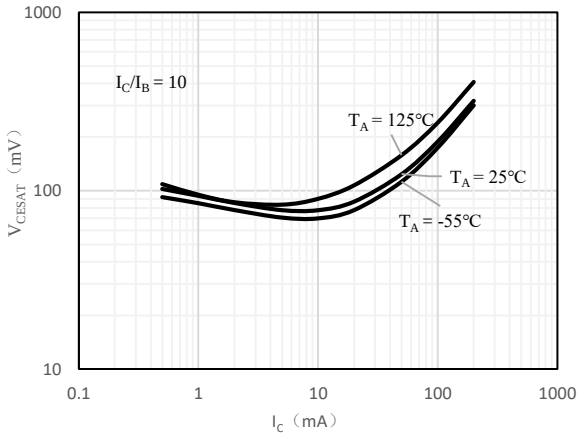


Fig 2 $V_{CE(sat)}$ vs. I_C

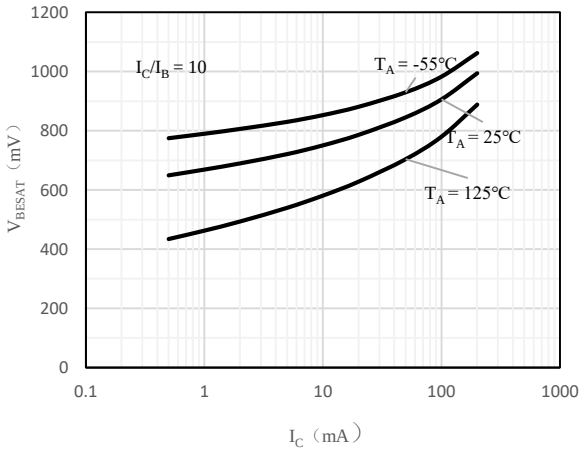


Fig 3 $V_{BE(sat)}$ vs. I_C

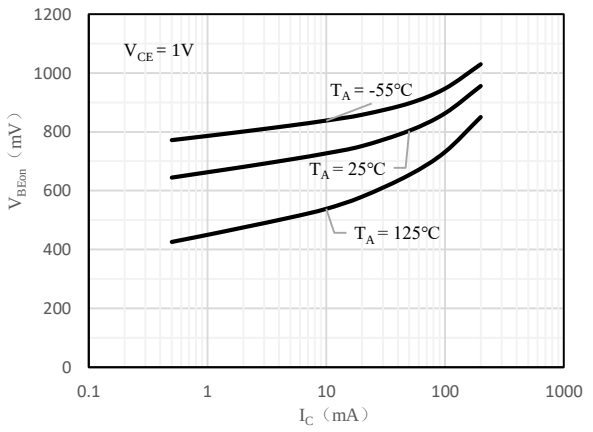
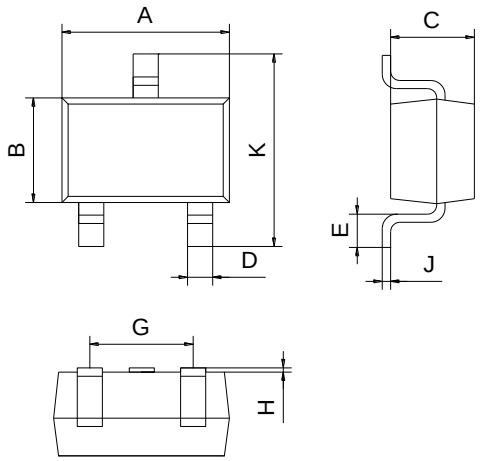


Fig 4 $V_{BE(ON)}$ vs. I_C

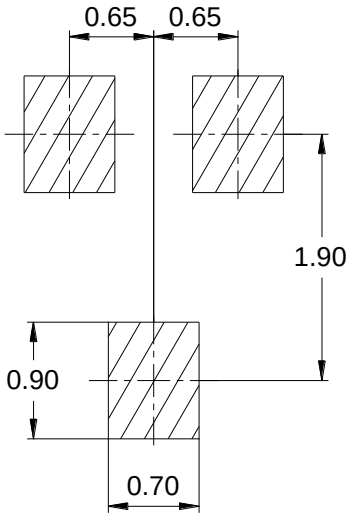
Package Outline Dimensions (Unit: mm)



SOT-323		
Dimension	**Min.**	**Max.**
A	2.00	2.20
B	1.15	1.35
C	0.90	1.10
D	0.15	0.35
E	0.25	0.40
G	1.20	1.40
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

Mounting Pad Layout (Unit: mm)

SOT-323



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